

CLAIMS

What is claimed is:

1 1. A method for manufacturing a light-emitting panel in a web configuration
2 comprising:

3 (a) providing a first substrate in a web form, the first substrate having a plurality
4 of first conductors formed thereon;

5 (b) disposing at least one micro-component of a plurality of micro-components at
6 each of a plurality of first locations on the first substrate corresponding to the plurality of
7 conductors, each micro-component adapted to emit radiation in response to electrical
8 excitation;

9 (c) depositing a liquid dielectric material onto the first substrate to electrically
10 isolate the plurality of micro-components from each other;

11 (d) curing the liquid dielectric material to form a dielectric layer;

12 (e) depositing a conductive liquid on top of the dielectric layer at a plurality of
13 second locations adapted to interact with the first conductors to excite one or more
14 selected micro-components;

15 (f) curing the conductive liquid to create a conductive film for providing second
16 conductors;

17 (g) applying a top layer over the dielectric layer and the second conductors.

1 2. The method of claim 1, wherein the micro-components are coated with a
2 phosphor material

1 3. The method of claim 2, wherein the phosphor material is applied to the
2 micro-components by immersing the micro-components in a slurry of phosphor particles,
3 then curing a phosphor coating formed on the micro-components.

1 4. The method of claim 1, further comprising, prior to step (g), the steps of
2 depositing a liquid black mask layer onto the first substrate and the conductive layer; and
3 curing the liquid mask material to form a black mask layer.

1 5. The method of claim 1, further comprising:

2 photolithographically patterning the conductive film to form the second
3 conductors.

1 6. The method of claim 5, wherein the step of photolithographically
2 patterning comprises selectively exposing a photosensitive material by contacting the
3 photosensitive material with a leaky optical waveguide.

1 7. The method of claim 1, wherein the first substrate has a plurality of
2 dimples formed therein, wherein one dimple is formed at each of the plurality of first
3 locations.

1 8. The method of claim 7, wherein an adhesive material is applied within
2 each of the plurality of dimples for securing the micro-component in the dimple.

1 9. The method of claim 1, wherein the step of depositing a conductive liquid
2 comprises printing an electrode pattern with a conductive ink.

1 10. The method of claim 9, wherein the printing comprises inkjet printing.

1 11. The method of claim 1, wherein the liquid dielectric material has a surface
2 tension adapted to provide a uniform thickness across the first substrate.

1 12. The method of claim 1, wherein the liquid dielectric material includes a
2 surfactant.

1 13. The method of claim 1, further comprising disposing an RF screen over
2 the top layer.

1 14. The method of claim 1, further comprising, prior to step (g), repeating
2 steps (c) through (f) at least one time to form additional conductors.

1 15. A method for forming a flexible light emitting panel comprising:

2 (a) feeding a first dielectric substrate material from a payout reel in a web coating
3 machine;

4 (b) printing a first plurality of electrodes on the first dielectric material;

5 (c) before or after printing the first plurality of electrodes, forming a plurality of
6 sockets at a plurality of location in the first dielectric material;

7 (d) disposing at least one micro-component in each socket of the plurality of
8 sockets, wherein the at least one micro-component is adapted to emit light in response to
9 electrical excitation;

10 (e) applying a liquid dielectric material over the first dielectric material, the first
11 plurality of electrodes, and at least a portion of each micro-component of the plurality of
12 micro-components;

13 (f) curing the liquid dielectric material to form a dielectric layer;

14 (g) printing a second plurality of electrodes over the dielectric layer using a
15 conductive ink;

16 (h) curing the conductive ink;

17 (i) applying a top layer over the dielectric layer, the second plurality of electrodes
18 and the micro-components.

1 16. The method of claim 15, further comprising the step of applying an
2 adhesive material within each of the plurality of sockets for securing the micro-
3 component in the socket.

1 17. The method of claim 15, wherein step (d) comprises using electrostatic
2 sheet transfer to place each micro-component into an appropriate socket

1 18. The method of claim 15, wherein step (g) comprises inkjet printing.

1 19. The method of claim 15, wherein the liquid dielectric material has a
2 surface tension adapted to provide a uniform thickness across the first substrate.

1 20. The method of claim 15, wherein the liquid dielectric material includes a
2 surfactant.

1 21. The method of claim 15, further comprising disposing an RF screen over
2 the top layer.

1 22. The method of claim 15, further comprising, prior to step (i), repeating
2 steps (e) through (h) at least one time to form at least one additional plurality of
3 electrodes.

1 23. The method of claim 15, wherein the micro-components are coated with a
2 phosphor material

1 24. The method of claim 23, wherein the phosphor material is applied to the
2 micro-components by immersing the micro-components in a slurry of phosphor
3 particles, then curing a phosphor coating formed on the micro-components.

1 25. The method of claim 15, further comprising, prior to step (i), the steps of
2 depositing a liquid black mask layer onto the first substrate and the conductive layer;
3 and

4 curing the liquid mask material to form a black mask layer.

1 26. A method for forming a flexible light emitting panel comprising:

2 (a) feeding a first dielectric substrate material from a payout reel in a web coating
3 machine;

4 (b) printing a first plurality of electrodes on the first dielectric material;

5 (c) before or after printing the first plurality of electrodes, forming a plurality of
6 sockets at a plurality of location in the first dielectric material;

7 (d) disposing at least one micro-component in each socket of the plurality of
8 sockets, wherein the at least one micro-component is adapted to emit light in response to
9 electrical excitation;

10 (e) aligning a second sheet material having dielectric properties over the first
11 dielectric substrate material and the first plurality of electrodes, wherein the second
12 dielectric sheet material has a plurality of openings therethrough corresponding to the
13 plurality of locations, the plurality of openings having diameters larger than an outer
14 diameter of the micro-component; so that a gap is created between an inner diameter of
15 each opening and the outer diameter of each micro-component;

16 (f) applying a liquid dielectric material over at least a portion of the second sheet
17 material so that the gap corresponding to each micro-component is filled, the liquid
18 dielectric material having dielectric properties adapted for control of electric field and
19 breakdown characteristics of the micro-component;

20 (g) curing the liquid dielectric material;

21 (h) printing a second plurality of electrodes over the second sheet material using
22 a conductive ink;

23 (i) curing the conductive ink;

24 (j) applying a top layer over the second sheet material, the second plurality of
25 electrodes and the micro-components.

1 27. The method of claim 26, further comprising the step of applying an
2 adhesive material within each of the plurality of sockets for securing the micro-
3 component in the socket.

1 28. The method of claim 26, wherein step (d) comprises using electrostatic
2 sheet transfer to place each micro-component into an appropriate socket

1 29. The method of claim 26, wherein step (h) comprises inkjet printing.

1 30. The method of claim 26, wherein the liquid dielectric material includes a
2 surfactant.

1 31. The method of claim 26, further comprising disposing an RF screen over
2 the top layer.

1 32. The method of claim 26, further comprising, prior to step (j), repeating
2 steps (e) through (i) at least one time to form at least one additional plurality of
3 electrodes.

1 33. The method of claim 26, wherein the micro-components are coated with a
2 phosphor material

1 34. The method of claim 33, wherein the phosphor material is applied to the
2 micro-components by immersing the micro-components in a slurry of phosphor
3 particles, then curing a phosphor coating formed on the micro-components.

1 35. The method of claim 26, further comprising, prior to step (j), the steps of
2 depositing a liquid black mask layer onto the first substrate and the conductive layer;
3 and
4 curing the liquid mask material to form a black mask layer.